Land-use guideline for corporations
working on the conservation of biodiversity

JBIB Guidelines for Sustainable Business Sites

【Excerpted Version】

Japan Business Initiative for Biodiversity
-Sustainable Land-Use Working Group-

Ecological Adaptation Global COE, Tohoku University

2nd Edition/2012

1 Background and Purpose

The Japan Business Initiative for Biodiversity (JBIB) engaged in a research project targeting corporate activities in an effort to understand the factors and relations affecting biodiversity in the supply chain processes from upstream to downstream. The results of this research show that the use and the management of industrial land (e.g., for factories and office buildings), as well as methods of procurement of raw materials and genetic engineering, can affect the ecosystem and biodiversity adversely or positively. In other words, biodiversity-conscious use of industrial land, particularly green spaces within the land (hereinafter referred to as the corporate green space), can improve the quality of the regional ecosystem and contribute to the sustainable use of the ecosystem service.

The corporate green space has focused preliminarily on securing green spaces in terms of quantity in order to comply with applicable laws and regulations including the Factory Location Act; therefore, less attention has been paid to the issue of biodiversity. Despite the need to pay more attention to the issue of biodiversity on their site, guidelines intended for corporations defining biodiversity-conscious green space and what action should be taken to establish it were lacking. Furthermore, efforts were delayed due to difficulties in evaluating biodiversity quantitatively and understanding the actual contribution to biodiversity with changes in land use.

In this context, this guideline was created to promote biodiversity-conscious use of land for the benefit of corporations that are eager to contribute to a sustainable society. Specifically, we demonstrate the concept of and provide a prescription for biodiversity-conscious use of land to help others visualize the achievement of the goal.

2 Characteristics

The JBIB established quantitative evaluation criteria for making the results of its efforts visually by developing “three promotion tools from the Sustainable Business Site Management. This guideline is one of them. The following are the purposes and features of each promotion tool:

◆ JBIB Guidelines for Sustainable Business Sites

The Promotion Guideline is an action agenda that defines the significance of biodiversity-conscious use of land within business site and outlines how land

should be used to contribute to biodiversity. The Promotion Guideline consists of practical explanations such as the significance of evaluation items for the Land Use Score Card™, a specific strategy and a framework for the PDCA (plan, do, check and act) management.

◆ JBIB Land Use Score Card™

The Land Use Score Card™ is a tool that evaluates the degree of contribution to and efforts toward biodiversity on a scale from 1–100. The report was designed on the assumption that representatives or facility management coordinators in office environments would use as a self scoring system. This tool clearly outlines signs of progress and deficiency, facilitating PDCA management, e.g., specific goal setting and planning.

◆ JBIB Monitoring Sheet

In order to confirm that efforts are directed to the contribution to biodiversity and to implement the PDCA cycle, regular checking and review is necessary to monitor whether a particular location is suitable for living organisms. It includes various living organismsthat can be identified in their silhouettes as environmental indicators to enable each corporate staff member to monitor living organisms continuously and easily.

In addition, establishment of a registration system for corporations that promotes their efforts toward biodiversity using these three promotion tools has currently been considered. This system will allow corporations to promote their efforts toward biodiversity and thus contribute to society in a way that is beneficial for everyone.

3 Expected Role of Corporate Green

Contributions to biodiversity can be achieved either by maintaining current functions and roles of the corporate green while conducting qualitative reviews of existing spaces, or by introducing green space concepts with the aim of contributing to biodiversity when creating new green spaces.

The following are three main roles to contribute to biodiversity:

(1) Role to contribute to conservation of regional biodiversity

■ Providing environments for wildlife to live and grow

If industrial land can provide a habitat for a variety of species, the regional

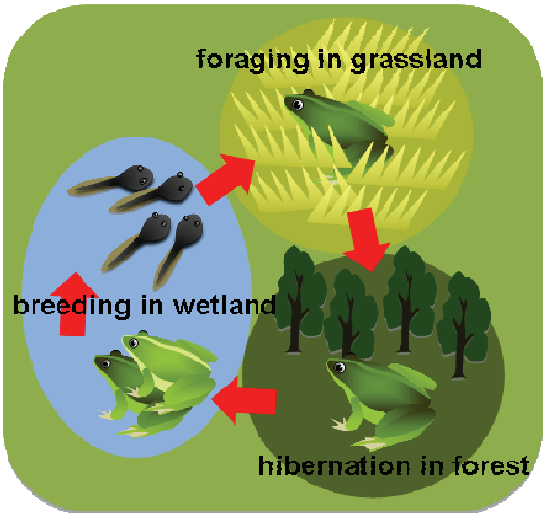
ecosystem will remain stable, and human life will also be stabilized.

This initiative will lead to provide a home to living organisms that depend on lost ecosystems by creating an environment suited to each location (not only forestation) on industrial land and managing the environment appropriately.

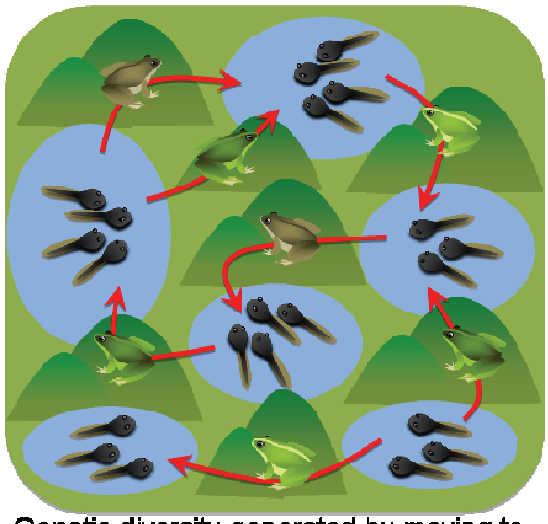
■ Forming ecosystem networks

Most wildlife uses a variety of environments for foraging, resting and breeding. In order to preserve genetic diversity over time, it is important that various environments such as forest, grassland and waterfront areas are accessible to each other, and that living organisms are able to move to similar environments in their neighborhood. This spatial connection of ecosystems is called an “ecosystem network”.

Land owned by corporations, which is dispersed throughout urban areas and divides important habitats, plays a key role in the formation of ecosystem networks. Connection of important habitats and restoration of ecosystem networks are possible through appropriate use of land, which requires understanding of places where the important habitats are left in their surrounding areas; what living organisms exist there, and original vegetation patterns in those areas.



Frog habitats. Accessibility to various environments is required.



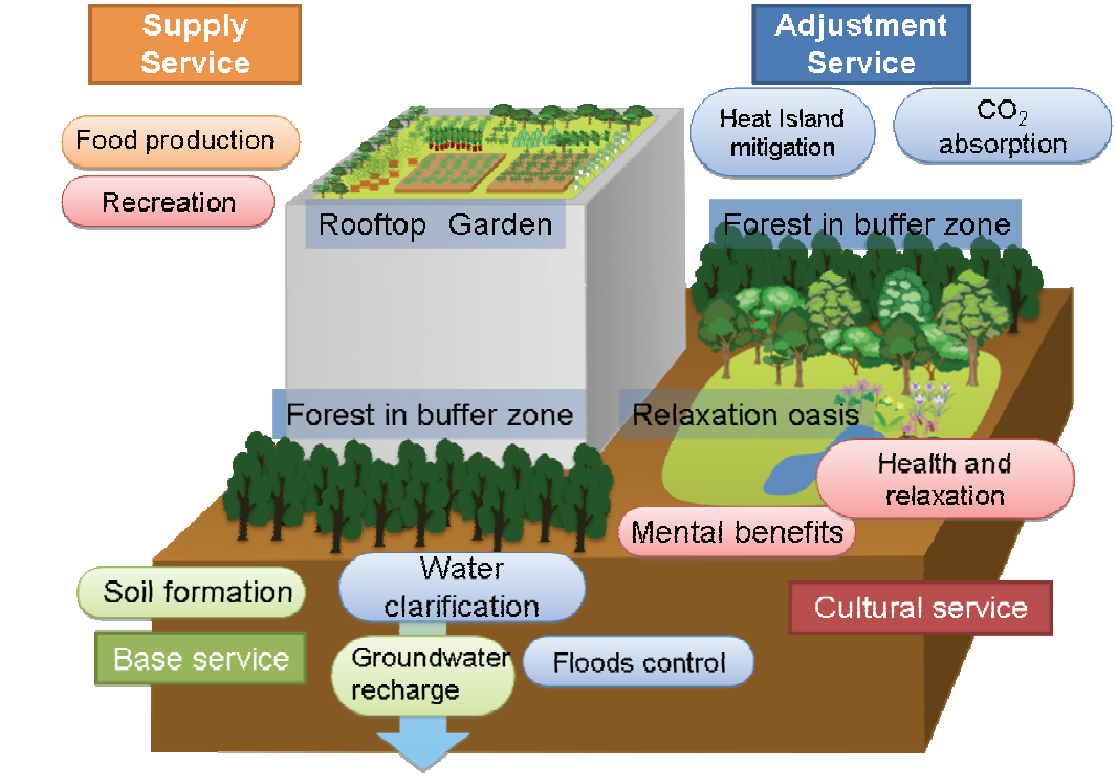
Genetic diversity generated by moving to the neighboring ponds for breeding sometimes. Accessibility to similar environments is required.

■ Protecting Rare Animals and Plants

When endangered and rare species exist within the corporate green or in the neighborhood, contribution toward the conservation of such species may be available through the corporate green. Even in areas under great pressure of development, habitats can be maintained in good condition for a long period of time if they are secured as the industrial land.

(2) Role to contribute to sustainable use of the Ecosystem Service

Most of industrial land is located in urban areas, where the biodiversity that supports the ecosystem service is significantly declining due to advanced development. Therefore, the ecosystem service factors that had been led by the ecosystem itself in the past are replaced by technology with consumption of much amount of energy and chemical emissions. However, this is not a sustainable resolution. Biodiversity -conscious use of land will help properly restore the benefits of the ecosystem service and allow us to receive these benefits sustainably.



Various benefits of the ecosystem service factors led by corporate green space

(3) Role as a contact to realize coexistence with nature

As the number of places at which we can appreciate nature has been rapidly reduced in the city, the corporate green space dotted across the nation is becoming familiar as the nearest access to the natural environment. To promote "biodiversity literacy", the corporate green provides employees and regional residents with the opportunity to interact with nature, and serves as a contact for helping people to realize that they coexist with nature. Regional consensus-building toward realization of "a society in harmony with nature", which can be advanced through activities based on the corporate green space, has become important than ever.

4 Evaluation of biodiversity-conscious efforts

-- Utilization of Land Use Score Card™ --

In the JBIB Land Use Score Card™ , biodiversity efforts in the site have been narrowed down to 17 items in three categories, evaluated on a 100-point scale. The three categories are

"creation of a biodiversity-conscious environment",

"promotion of sustainable maintenance and management with taking advantage of natural cycles" and

"communication with stakeholders".

Comprehensive evaluation of biodiversity efforts both in hard and soft aspects can be performed through these categories as follows.

I. In the category of **"creation of a biodiversity-conscious environment"**, evaluation involves the hard aspects of green space, such as its area and structure, unifying and connecting features, and community-based vegetation, from the perspective of the development of green spaces in which many existing living organisms can thrive.

II. In the category of **"promotion of sustainable maintenance and management with taking advantage of natural cycles"**, evaluation includes appropriate use of chemical substances, consideration of water and material environments and monitoring living organisms, from the perspective of the significance of maximum use of the natural cycle in the maintenance and management of irrigation, fertilization, pest control, weeding, pruning and disposal of fallen leaves, while considering the condition of the land surrounding of their facilities.

III. In the category of **"communication with stakeholders"**, evaluation entails regional partnership, promotion of various awareness programs, employee participation and building of human resources who will take responsibilities of these efforts, from the perspective of the significance of cooperation with the community and building of human resources to continue biodiversity efforts and maximize their effects.

The concept of evaluation, detailed description of the specific efforts and evaluation methods for each category are outlined below.

I. Creating an environment contributing to biodiversity

For example ;

[1]Large area of habitat contributing to biodiversity

A larger area of habitat can accommodate more species and help avoid eradication arising from accidental damage, including diseases and disasters. Because the smaller the number of species is, the higher the probability of extinction becomes. In order for fauna and flora to breed and produce next-generation offspring, many species are required and therefore a large habitat area is needed.

However, a green space is not the only area that contributes to biodiversity; living organisms need a variety of environments including those for foraging and nest building to complete their life cycle, some of which need a waterside or graveled area to survive. For example, some animals that can be seen only in the riverbeds also make use of nearby exposed areas with few plants. Most living organisms that live and grow in such special environments are now endangered species. For this reason, this category includes a green area where trees and plants grow and water surface area, as well as rocky, graveled and sandy areas, and areas where the soil is visible with the aim toward biodiversity in calculating the area ratio contributing to biodiversity. By creating a larger area of habitat suitable for local living organisms, we would be able to conserve the biodiversity in that community.

Lucust living on dry riverbed gravels

Adapted from: "Lucust, cricket and bush cricket in Japan" by Takashi Murai

Little tern breeding on dry beach

Adapted from: "Nine birds" by E. Nakanishi

Creature specifically living in bare area

♦ Evaluation method and criteria

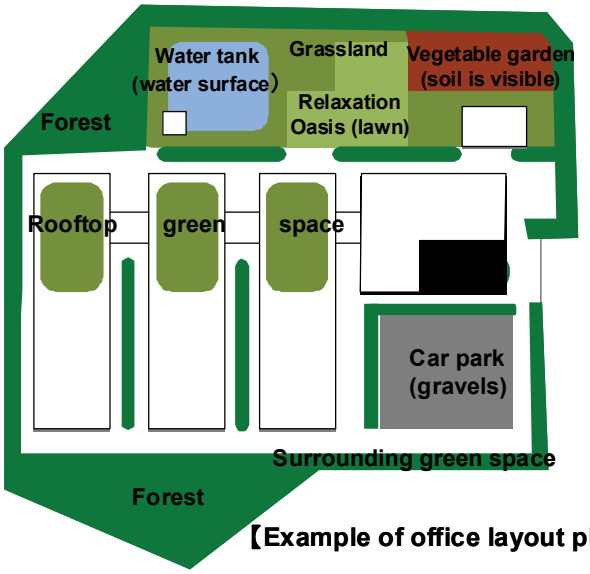
The area ratio on the site contributing to biodiversity will be evaluated as % = area contributing to biodiversity / site area × 100. Land contributing to biodiversity includes:

- Green space within the site (e.g., forest pond, grassland, lawn, flowerbed, vegetable garden)
- Rooftop green space
- Water surfaces (including those that provide habitats for living organisms although they are not installed for any reason other than for providing an environment for them, such as a regulation pond, fire prevention tank, reservoir after drainage treatment, or pooled water in winter; excluding those that living organisms cannot use, such as chemically treated water)
- Other lands (non-paved surfaces including rocky, graveled, and sandy areas and areas where the soil is visible)

In order to calculate the area of land contributing to biodiversity in practical, it is necessary to confirm the actual spots contributing to biodiversity and its area by taking a plan view of the site. Taking the office site described in figure below as an example, the total area of all the spots indicated in the colors green, red, and gray will be divided by the total area of the site. Any land that is not in use temporarily but unintentionally contributes to biodiversity as bare land or grassland will be added to the area.

The evaluation will be scored according to the area ratio contributing to biodiversity as follows:

▪ 40% and more	10 points
▪ Between 35% (inclusive) and 40% (exclusive)	8 points
▪ Between 30% (inclusive) and 35% (exclusive)	6 points
▪ Between 20% (inclusive) and 30% (exclusive)	4 points
▪ Between 10% (inclusive) and 20% (exclusive)	2 points
▪ Less than 10%	0 points



【Example of office layout plan】

♦ Strategies for goal achievement

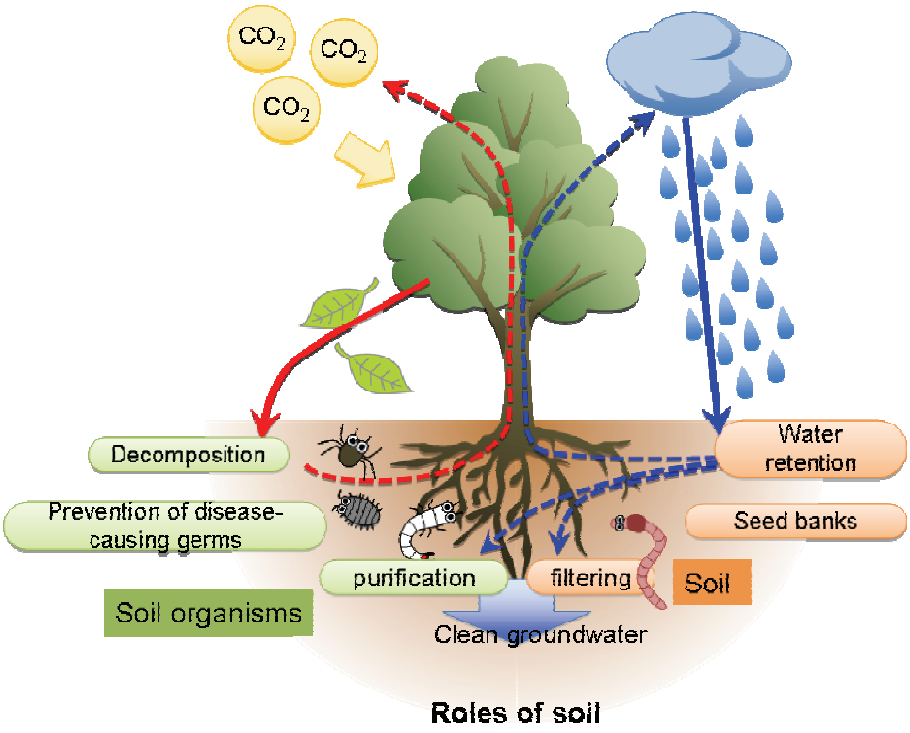
It is necessary to secure as much green space as possible at the time of design; in addition, existing sites and buildings are required to increase the area contributing to biodiversity, from a long-term perspective, considering the plans for building refurbishment. If there is not enough space for green space, a rooftop may be used as a place contributing to biodiversity. Moreover, there is a way to increase the value of existing car parks as they may act as sites for rain penetration or habitats for soil-dwelling animals if pavements are removed.

II. Promotion of the sustainable maintenance and management utilizing the natural cycle

For example ;

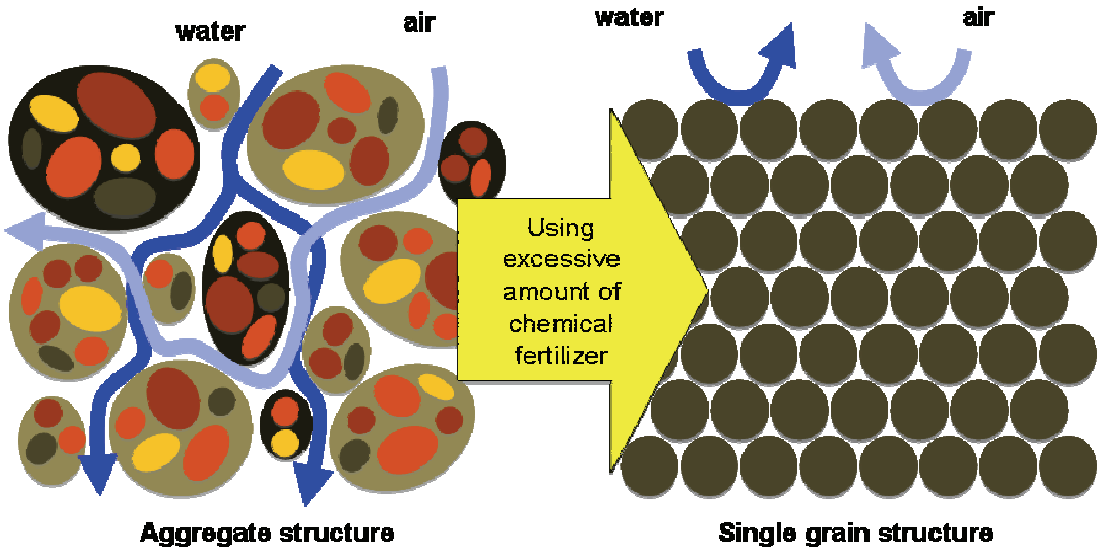
[9] Appropriate management of the use of chemical substances

Soil plays an important role in the material cycle in the natural world. As in natural soil, in a place where various soil organisms exists, the decomposition of organic substances like fallen leaves is enhanced to become nutrients. Inhabited by various soil organisms, disease and pests can be prevented, resulting in the reduction of the use of chemical fertilizers and agricultural chemicals.



Roles of soil

Nutrients including phosphorus and nitrogen are required for plants to grow. Unlike organic fertilizers including compost that are decomposed and absorbed slowly, chemical fertilizers have been widely used because they are absorbed by plants quickly and amounts to be provided can be calculated. However, the use of a large amount of chemical fertilizers causes dramatic decrease in soil organisms that feed on organic substances decomposed in organic fertilizers. If soil organisms disappear, the soil will turn into single grain soil and be harden gradually, blocking fresh air and water.



Change of soil structure by excessive amounts of chemical fertilizers

Then, is everything resolved if switching to organic fertilizers? The answer is no. When maintaining green areas, we need to carefully determine whether it is necessary to use fertilizers and pay attention not to use them excessively. In addition to nutrients for plants, it is important to use fertilizers considering soil improvement that helps maintain the ecosystem balance in the soil, including soil organisms.

Also, chemicals including herbicide, pesticide, and fungicide are used effectively to control disease and pests for trees, but they sometimes cause huge damage to harmless living organisms in the area as well as the targeted harmful insects. In order not to adversely affect the living organisms in the area or maintain the ecosystem, chemicals should not be used as far as possible. If chemicals are used, it is important to make efforts to reduce adverse effects while considering the type and amounts of chemicals, spray timing, and method.

♦ Evaluation method and criteria

The use of chemical synthesis fertilizers and each of herbicide, pesticide, and fungicide

will be evaluated:

«About chemical synthesis fertilizer»

- No chemical synthesis fertilizer is used (3 points): No chemical synthesis fertilizer is used in all green space areas within the site (including both cases where no chemical synthesis fertilizer is used and only organic fertilizers are used).
- Part of chemical synthesis fertilizers are switched to organic fertilizers (1 point): Chemical synthesis fertilizers are used for part of trees and flowerbeds, but efforts are made to reduce chemical synthesis fertilizers by switching some of them to organic fertilizers or composts.
- Only chemical synthesis fertilizers are used (0 point): No effort is made for switching to organic fertilizers or soil improvement.

«About chemicals such as herbicide, pesticide, and fungicide»

- Disease and pests are controlled across the green area without using chemicals (5 points): In addition to the prevention of the occurrence of disease and pests through the integrated pest management (IPM) method (*refer to the strategy for goal achievement) including diversifying the structure of trees across the green area, disease and pests are regularly monitored and substances derived from nature are used instead of chemicals, or disease and pests are manually removed in case of occurrence.
- Chemicals are used only in spots where disease and pests occur across the green area (4 points): Disease and pests are regularly monitored across the green area, and chemicals are used only for the targeted plant in a particular spot in case of occurrence.
- Disease and pests are controlled in 50% or more of the green area without using chemicals (3 points): Disease and pests are controlled in 50% or more of the green area without using chemicals, but chemicals are used in the remaining area in case of occurrence or in a preventive manner, or nothing is done for the prevention of disease and pests.
- Chemicals are used only in spots of 50% or more of the green area in case of disease and pests (2 points): Chemicals are used in 50% or more of the green area in case of disease and pests, but chemicals are spayed in the remaining area in a preventive manner, or nothing is done for the prevention of disease and pests.
- Chemicals are used in a preventive manner but efforts are made to reduce amounts to be sprayed (1 point): Efforts are made to reduce amounts of chemicals to be sprayed or the frequency of use, or part of chemicals are being switched to substances derived from nature. Alternatively, efforts are made not to use chemicals in part of the green area (50% or less of the green area) or use chemicals only in spots.
- Chemicals are sprayed across the green area in a preventive manner or nothing is done (0

point): Chemicals are regularly sprayed on the entire plants across the green area in a preventive manner (spraying across the green area without confirmation of the occurrence of disease and pests), or nothing is done for the prevention of disease and pests across the green area.

♦ Strategy for goal achievement

«About the use of chemical synthesis fertilizer»

We should create green space in a way not to depend on fertilizers by improving soil to increase soil organisms. In a depleted place where plants are difficult to grow without fertilizers, organic fertilizers instead of chemical fertilizers should be used, and amounts of organic fertilizers should be adjusted by confirming the growth condition, in an attempt to avoid excessive fertilizers to be provided. It is also effective to transform fallen leaves collected within the green space area into compost to be cycled within the site by installing a compost system.

«About chemicals such as herbicide, pesticide, and fungicide»

In order to control disease and pests without chemicals, the cultural control, biological control and physical control methods can be used:

- Cultural control: Control method by establishing an environment that prevents the occurrence of disease and pests; a single vegetation is likely to cause the occurrence of disease and pests, therefore disease and pests can be controlled by planting various kinds of plants. Furthermore, it is effective to prevent the outbreak or expansion of disease and pests by improving the soil with better drainage and ventilation, or securing a well-ventilated environment by means of appropriate trimming of the trees.

- Biological control: The number of birds and beneficial insects that prey on harmful insects will increase and the balance of ecosystem will be maintained by establishing an environment that enables various living organisms to inhabit and grow, which makes it difficult for disease and pests to occur. Even in case of occurrence, their expansion can be prevented.

- Physical control: In case of the occurrence of disease and pests, best efforts should be made to remove them in a physical way, by removing the insects or cutting the diseased portion. If the occurrence period or location is limited in a vegetable garden, preventive measures can be made by using a protective net to cover the plants.

As described above, the integrated pest management (IPM) refers to the management method where the occurrence of disease and pests are predicted, the cultural, biological and physical control methods are appropriately combined with chemicals, and the occurrence of disease and pests is reduced while environmental loads are lowered. The guideline for the IPM is sometimes established by respective municipalities, or can be downloaded from the website of the Ministry of the Environment shown below:

Adapted from: "Manual for controlling disease, pests, and weeds in parks and on street trees" by the Ministry of the Environment
http://www.env.go.jp/water/dojo/noyaku/hisan_risk/manual1_kanri/full.pdf

III. Communication with Stakeholders

For example ;

[14] Coordination with the community and specialists

Japan is a long-shaped country stretching from south to north with many uphills and downhills along with a variety of climates, therefore, we should create different ecosystems and environments depending on the location of the business site. In order to truly contribute to diversity of the region, it is necessary to coordinate with multiple organizations with a good knowledge that are able to evaluate green space in a comprehensive manner and support planning, management and administration. Specifically, it is important to ask specialists who are acquainted with the characteristics of regional ecosystem and biota such as municipalities, research institutes (e.g. university), museums, environment NGOs/NPOs, and private professionals/professional companies, to participate in various phases of planning, management and administration of the corporate green, as appropriate. Furthermore, it is effective to make those efforts in coordination with corporations in the neighborhood.

♦ Evaluation method

The process of planning and project administration continuously participated by the community and specialists based on an organizational coordination with them is evaluated.

The evaluation will be scored as follows:

- Maintaining coordination with specialists who are acquainted with the regional ecosystem, such as municipalities, universities, museums, environment NGOs/NPOs, and private professionals/professional companies, a framework is established to enable planning,

management and administration to be implemented on a continuous manner. (3 points)

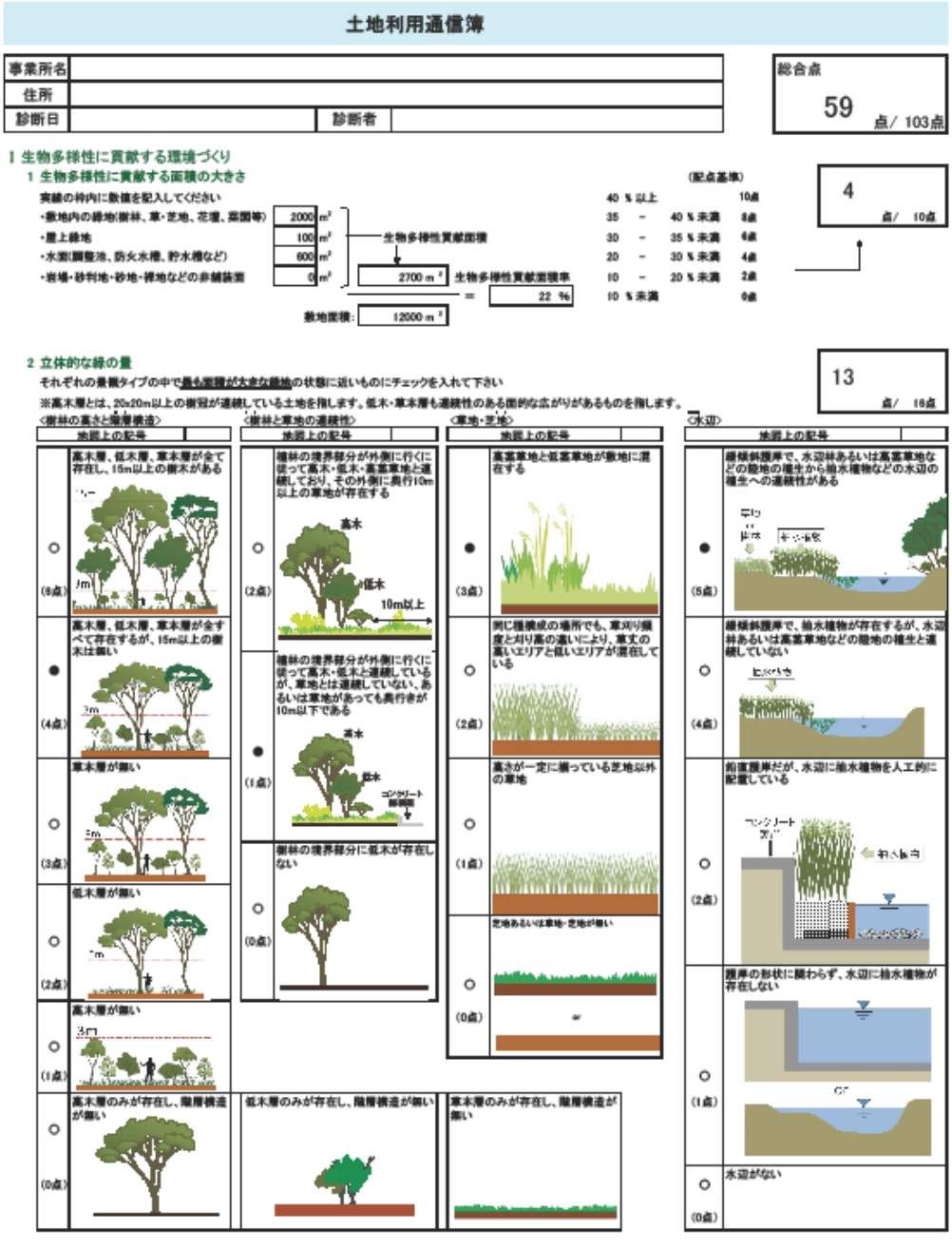
- Having consulted the specialists stated above for planning, management, and administration. (1 point)
- Internal efforts are completed, having never consulted an external specialist. (0 point)

♦ Strategy for goal achievement

A framework needs to be established to make it possible to look for and contact specialists who are acquainted with the regional ecosystem, such as municipalities, universities and museums in the neighborhood, environment NGOs/NPOs, and private professionals/professional companies and ask for advice regarding planning, management and administration.

【JBIB　Land Use Score Card™】

With the Land Use Score Card™, the users can evaluate the biodiversity of their company site. (The evaluation criteria includes the size of the green areas as well as the layered structure of vegetation and appropriate maintenance and management of those areas.)

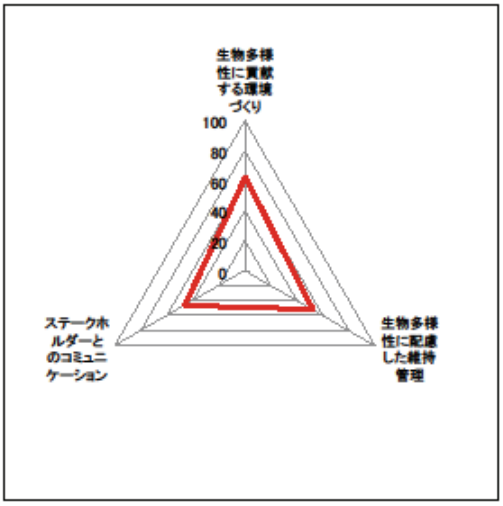


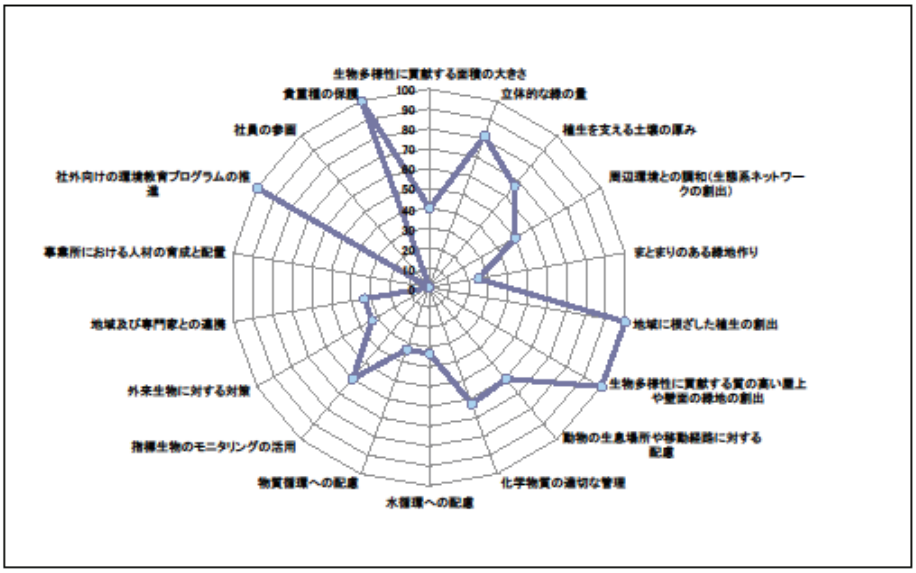
After answering all of the questions, the users can see the strong and weak points of their green space by checking over the score sheet. Then they will know what action they should take to make the needed improvements.

事業所名			
住所			
診断日		診断者	

総合点
59 点/ 103 点

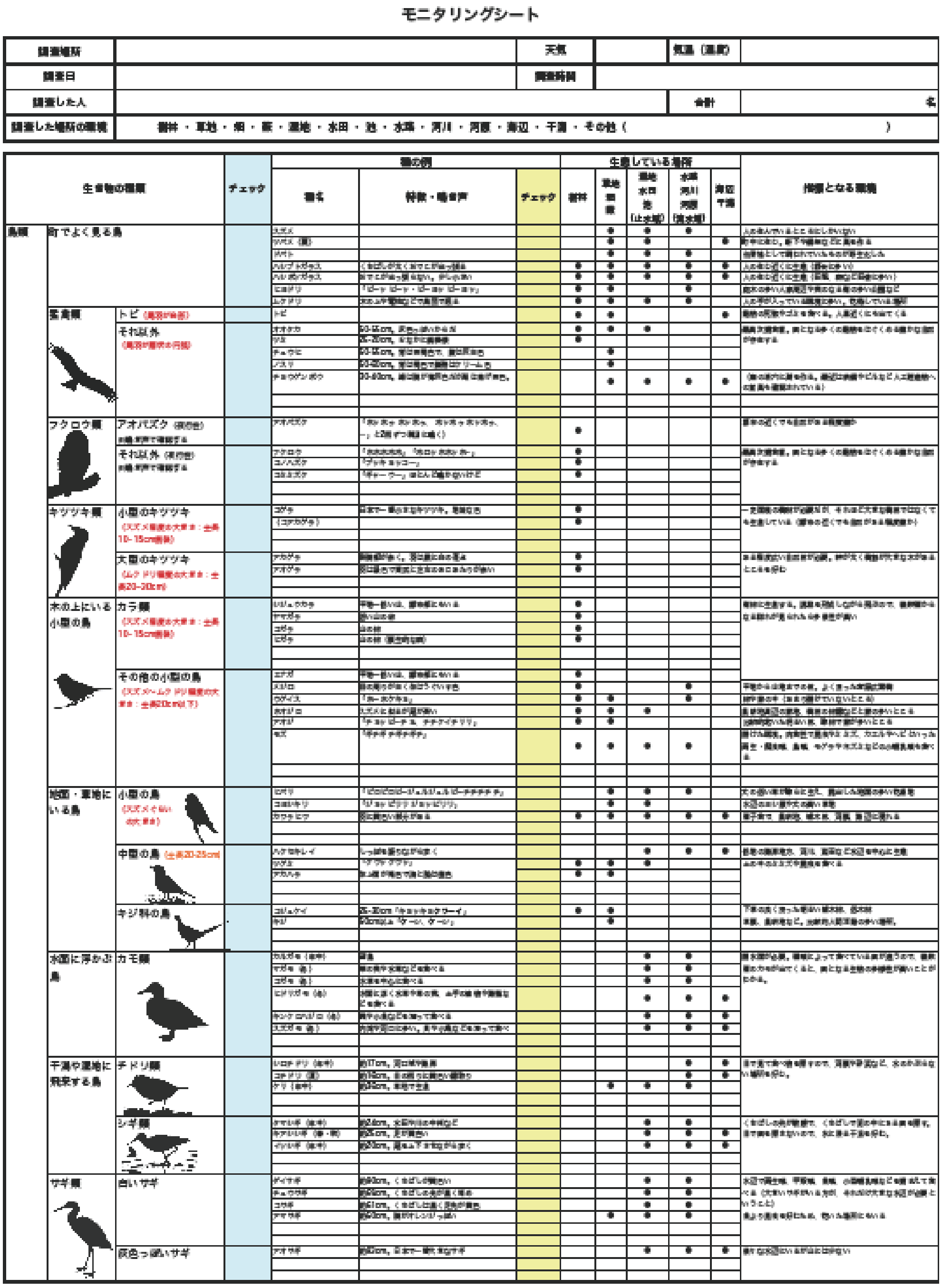
	項目	得点 / 満点
I	生物多様性に貢献する環境づくり	38 / 61
1	生物多様性に貢献する面積の大きさ	4 / 10
2	立体的な緑の量	13 / 16
3	まとまりのある緑地作り	2 / 8
4	植生を支える土壌の厚み	4 / 6
5	周辺環境との調和（生態系ネットワークの創出）	4 / 8
6	地域に根ざした植生の創出	3 / 3
7	生物多様性に貢献する質の高い屋上や壁面の緑地の創出	5 / 5
8	動物の生息場所や移動経路に対する配慮	3 / 5
II	生物多様性に配慮した維持管理	14 / 27
9	化学物質の適切な管理	5 / 8
10	水管理への配慮	1 / 3
11	物質管理への配慮	1 / 3
12	指標生物のモニタリングの活用	6 / 10
13	外来生物に対する対策	1 / 3
III	ステークホルダーとのコミュニケーション	7 / 15
14	地域及び専門家との連携	1 / 3
15	事業所における人材の育成と配置	0 / 3
16	社員の参画	0 / 3
17	社外向けの環境教育プログラムの推進	3 / 3
18	貴重種の保護	3 / 3





【JBIB Monitoring Sheet】

With the help of the JBIB Monitoring Sheet, company employees can easily identify birds and insects found on their company's site. Use of the monitoring sheet involves the participation of company employees in identifying a variety of species, and it has an educational effect on them as well for learning about sustainable site management.

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